will be cured at 400 degrees C. for 1 hour in a vacuum or nitrogen ambient. For thicker polyimide, the polyimide film can be multiple coated and cured.

Another material that can be used to create layer 5 is the polymer benzocyclobutene (BCB). This polymer is at this time commercially produced by for instance Dow Chemical and has recently gained acceptance to be used instead of typical polyimide application.

The dimensions of opening 7 have previously been discussed. The dimension of the opening together with the dielectric thickness determine the aspect ratio of the opening. The aspect ratio challenges the via etch process and the metal filling capability. This leads to a diameter for opening 7 in the range of approximately 0.5 um. to 3.0 um. while the height for opening 7 can be in the range of approximately 3 um. to 20 um. The aspect ratio of opening 7 is designed such that filling of the via with metal can be accomplished. The via can be filled with CVD metal such as CVD tungsten or CVD copper, with electro-less nickel, with a damascene metal filling process, with electroplating copper, etc.

It must be noted that the use of polyimide films as inter-level dielectrics has been pursued as a technique for providing partial planarization of a dielectric surface. Polyimides offer the following characteristics for such applications:

- they produce surfaces in which the step heights of underlying features are reduced, and step slopes are gentle and smooth.
- they are available to fill small openings without producing the voids that occur when low-temperature CVD oxide films are deposited.
- the cured polyimide films can tolerate temperatures of up to 500 degrees C. without degradation of their dielectric film characteristics.
- polyimide films have dielectric breakdowns, which are only slightly lower than that of SiO_2.
- the dielectric constant of polyimides is smaller than that of silicon nitride and of SiO_2.
- the process used to deposit and pattern polyimide films is relatively simple.

For all of the above characteristics, polyimides are used and recommended within the scope of the present invention.

Fig. 2 shows how the present invention as indicated in

Fig. 1 can be further extended to include multiple layers of polyimide and, in so doing, can be adapted to a larger variety of applications. The lower level build up of this cross section is identical to the build up shown in Fig. 1 with a silicon wafer 1, the poly silicon layer 2, the metal and dielectric combined layer 3, the passivation layer 4, the polyimide layer 5 and the pads 10 deposited on top of layer 5. The function of the structure that has been described in Fig. 1 can be further extended by depositing another layer of polyimide 14 on top of the previously deposited layer 5 and overlaying the pads 10. Selective etching and metal deposition can further create contact points 12. These contact points 12 can be connected with pads 10 as shown by connector 13. Depositing pads 12 on top of layer 14 can thus further extend this process. These pads 12 can be further customized to a particular application, the indicated extension of multiple layers of polyimides greatly enhances the flexibility and usefulness of the present invention. Additional alternating layers of polyimide and metal lines and/or power or ground planes may be added above layers 12 and 16, as needed.

Figs. 3a and 3b show a top view of one possible use of the present invention. Interconnecting a number of pads 32 that have been created as described creates signal lines 30. Additional contact points such as point 34 can allow signal lines to pass